

DEQ's INITIAL GENERAL COMMENTS
DRAFT ENGINEERING EVALUATION/COST ANALYSIS GASCO SEDIMENTS CLEANUP SITE
Dated May 2012

Comments dated July 17, 2012

1. Consistent with DEQ's September 22, 2011 letter commenting on the Revised Interim Design Report¹, the remedial action objectives (RAOs) for groundwater source control are to prevent migration of contaminated groundwater from the uplands to the Willamette River in a manner that minimizes DNAPL mobilization resulting from groundwater source control measures (SCMs) along the portion of the shoreline where DNAPLs occurs. Preventing contaminated groundwater from migrating to the river involves controlling and containing groundwater in the Fill water-bearing zone (WBZ) and the Alluvium WBZ. To control and contain groundwater in the Fill WBZ, DEQ accepted NW Natural's approach of using a fully-penetrating interceptor trench. The Alluvium WBZ SCM is a well-based hydraulic control and containment (HC&C) system designed to reverse hydraulic gradients from the river towards the uplands. Source control discussions presented in the Draft EE/CA (e.g., see Section 2.3.1.1) emphasize the status of the Alluvium WBZ HC&C system. However, source control will not have been achieved without preventing groundwater from both the Fill WBZ and the Alluvium WBZ from migrating to the river. NW Natural proposes to construct the interceptor trench concurrently with the riverbank cleanup included in the in-water sediment remedy. This proposal, including NW Natural's rationale, was previously presented in the Revised Interim Design Report. DEQ did not approve NW Natural's proposal, determining that postponing trench construction until sometime after the in-water project is initiated will significantly delay source control of the Fill WBZ. DEQ communicated our disagreement with NW Natural's proposal and our comments on the length, alignment, and sequence and schedule for construction of the interceptor trench in letters dated September 22, 2011 and December 7, 2011, which should be referred to for additional information.
2. NW Natural is developing a groundwater model to evaluate the performance and operation of the groundwater source control measures (SCMs). According to Section 2.3.1.1, the groundwater model and currently available data are used to predict the offshore extent of seepage control that will be achieved by the HC&C system subsequent to implementation. In addition, the groundwater model is used in conjunction with a sediment cap fate and transport model to assess the isolation cap effectiveness in Section 5.4. NW Natural indicates in Section 2.3.1.1 that the model predicts the HC&C system will reverse the groundwater gradients in the Alluvium WBZ over an area encompassing approximately 1,800 feet of shoreline and extending about 700 feet out and under the Willamette River. NW Natural further indicates that within this area: 1) seepage of groundwater from the Alluvium WBZ into the river will be prevented; and 2) concentrations of COI in sediment will decrease over time as surface water migrates from the river into the sediments. In general DEQ disagrees with these assertions and finds them to be unsupported for the following reasons:
 - There is no documentation provided in the Draft EE/CA regarding the model used to generate Figure 2.3.1.1-1. Although NW Natural indicates the model uses conservative assumptions,

¹ Anchor QEA, LLC, 2011, "Draft Groundwater Source Control Final Design Report, NW Natural Gasco Site," May (received May 9th), a report prepared on behalf of NW Natural.

information about the model set-up, input parameters, and the site conditions to which the model is calibrated are not provided. Furthermore, the model output upon which Figure 2.3.1.1-1 is based is not included in the Draft EE/CA and DEQ is not aware of this information being previously provided to EPA and/or DEQ for review.

- The uplands groundwater model referenced in the Draft EE/CA is currently undergoing development. According to NW Natural, the model will not be suitable for predictive purposes until the full-scale HC&C system is constructed and tested late this year, and that data is incorporated into the model next year. Consequently, the descriptions of model predictions presented in the Draft EE/CA should be considered preliminary and subject to change in the future.
 - NW Natural's assertion that COI concentrations in sediment will decline over time appears to presume that contaminated sediments are absent. As indicated in Section 8.3.6 (Adequacy of Controls), all of the remedial alternatives evaluated in the Draft EE/CA will leave residual contamination. Given the magnitude and distribution of contaminated sediment in the Gasco Sediment Project area, concentration trends of COI in sediment will ultimately be more dependent on, and controlled by the remaining residual sediment contamination. In other words, desorption of COI into the dissolved phase will have a negligible effect on concentrations in sediment and mass reduction overall, especially in areas where sediment is impacted by left-in-place MGP waste.
3. DEQ considers the riverbank risk screening and hot spot screening evaluations described in the Draft EE/CA and documented in Appendix F and Appendix H to be preliminary. As indicated by NW Natural, the Draft EE/CA screened riverbank data available from the top of bank down to approximately 13 feet NAVD88. NW Natural is performing a human health and ecological risk assessment of the Gasco Site uplands (Gasco Uplands RA) that will integrate and analyze riverbank and uplands data consistent with the human health and ecological exposure areas identified for the uplands. The hot spot determination for the Gasco Site uplands will be conducted following completion of the Gasco Uplands RA. The Draft EE/CA should be revised to reflect the findings and conclusions of the approved Gasco Uplands RA and hot spot determination to ensure the Gasco Sediment Cleanup Action achieves uplands and in-water RGs.
4. For purposes of identifying remedial alternative (Section 6), conducting detailed analyses of remedial alternatives (Section 7), and completing comparative analyses of alternatives (Section 8), the Draft EE/CA appears to presume the HC&C system will be a long-term fixture in the uplands that maintains the model-predicted hydraulic gradients from the river towards the uplands illustrated in Figure 2.3.1.1-1 for at least 100 years. However, the HC&C system is not identified in the Draft EE/CA as an element of the in-water remedy. In addition, the uplands feasibility study (FS) has not been initiated. Consequently, the HC&C system has not been subject to detailed analysis against uplands FS remedy selection factors. DEQ believes including the presence, operation, and influence of the HC&C as a baseline condition leads to overly favorable predictions regarding the long-term effectiveness of in-water remedial alternatives. Based on this information, DEQ believes it is not appropriate to rely on the HC&C to address subsurface contaminated sediment. That said, an active cap could be an effective approach to manage flux of contaminated groundwater to the river (contaminated from subsurface river sediment or otherwise). The Draft EE/CA should discuss the HC&C system in terms of being a common element of each of the in-water remedial alternatives, and fully explain how the presence or absence of the HC&C system influences predictions of the performance and effectiveness of alternatives.

5. The EE/CA borrows approaches from the draft Portland Harbor feasibility study (PHFS), which the EPA and government team have not commented on yet. Probably the most significant example of incorporating an approach from the draft PHFS is the use in the Draft EE/CA of the fate and transport (F&T) model, which appears to make very favorable predictions regarding the “natural burial” of surface sediment. EPA and USACE have not completed their detailed review of this model, but preliminarily have expressed concerns that it is an “uncoupled” model that may over-predict sediment deposition over time. Such natural recovery leads the Draft EE/CA to conclude that even the No Action alternative will achieve RAOs and PRGs over time (see below), and that all alternatives have equal and satisfactory long-term effectiveness. The F&T model is a key line of evidence for evaluating remedial alternatives and this model issue must be resolved to adequately evaluate Gasco sediment alternatives. Other draft PHFS elements may also change and affect the Draft EE/CA, including RAOs and risk assessment conclusions.
6. No remedial alternative discussed in the Draft EE/CA achieves PRGs immediately following completion of construction (i.e., at time “T” = 0). Consistent with pending comments on the draft PHFS, the goal should be that SWACs over an appropriate exposure area achieve RGs (or background) at or near T=0, and not at T=30 or 40 years. In other words, active remediation should be relied on for the majority of cleanup and MNR should be used to finish the job. The draft PHFS and Draft EE/CA appear to rely on MNR for the majority of cleanup. For example and setting aside the appropriateness of the benzo(a)pyrene (BaP) SWAC referenced here, Figure 7.2.2.1b indicates that all proposed alternatives take 35+ years to achieve a BaP SWAC of 423 ug/kg. While the draft PHFS inappropriately relies on site-wide SWACs to evaluate remedial alternatives, the EE/CA does (appropriately) use the exposure area associated with BaP (half-mile sections). However, the Draft EE/CA should confirm how far out into the river channel the half-mile section extends to further delineate the SWAC area.
7. The Draft EE/CA indicates that Alternative 3 excludes observations of liquid substantial product which do not occur within 0 to 3-feet below mudline because deeper occurrence was assumed to have limited potential for migration to the overlying surface sediments. DEQ notes that the physical migration of the product is not the only scenario that needs to be evaluated in the Draft EE/CA. For example, both liquid and non liquid product below a depth of 3-feet is a source for dissolved phase contaminant migration which can recontaminate cover material, impact sediment pore water, and load the cap. The Draft EE/CA needs to evaluate this contaminant migration and exposure pathway independent of the predictions made regarding the long-term influence of the HC&C system on hydraulic gradients between the uplands and river.
8. Alternative 5 incorporates all of the most conservative cleanup options (e.g., large dredging footprint, rigid containment [only outside Navigation Channel], removal of all substantial product, and extensive riverbank excavation and capping), and consequently represents an appropriate “bookend” alternative to Alternative 1 (No Action). However, there is no gradation in the middle remedial alternatives that incorporate some of these elements. As a result the costs and duration of Alternative 5 far exceed other alternatives. The Draft EE/CA therefore inappropriately skews the comparative evaluation of alternatives.
9. The Draft EE/CA reiterates the LWG’s conclusion from the draft PHFS that there are no Oregon Hot Spots in sediment in the Portland Harbor study area. Regarding the Gasco sediment project area, DEQ disagrees with this conclusion given the magnitude of contamination, notably the occurrence of MGP waste. That said, DEQ considers the subject of Hot Spots to be a matter requiring resolution in

the PHFS which should then be incorporated into the Gasco Sediment EE/CA. Pending resolution of the matter for the PHFS, DEQ has the following comments for future consideration and incorporation into the Gasco Sediment EE/CA.

- According to the Gasco Sediment Project Statement of Work (SOW), preference is given to removal of substantial product. The Draft EE/CA evaluates removal of varying degrees of substantial product, but concludes that the cost/benefit ratio for such removal is unfavorable. Since the Draft EE/CA concludes the No Action Alternative is protective (see F&T modeling comment above), the document also concludes the additional costs associated with removing substantial product is unwarranted. Riverbank Hot Spots are identified, but the Draft EE/CA incorrectly considers capping as treatment (DEQ considers this cap to be an engineering control) and concludes risk reduction is also not proportional to costs in this situation.
- The LWG does not recognize hot spots for total petroleum hydrocarbons (TPH) on the basis hydrocarbons are considered to be a mixture of chemicals (see Appendix F, page 4; Table F 2-1). However, DEQ has informed the LWG and NW Natural that TPH is considered a substance that needs to be included in hot spot evaluations for non-carcinogenic and ecological effects.
- Non-cancer effects of PCBs need to be considered in determining hot spot levels. Although, it is acceptable to consider individual congeners for cancer hot spots, the lowest hot spot levels for PCBs are based on non-cancer effects. DEQ now has a hot spot table to facilitate the non-cancer evaluations of PCBs.

10. Draft EE/CA SMAs assume that excavation of river sediment near the toe of slope requires 3:1 riverbank layback. Although the Draft EE/CA notes the final design would likely result in a steeper bank slope, the Draft EE/CA assumes a 3:1 slope for evaluating alternatives. This assumption results in excavation footprints that damage or destroy uplands groundwater SCMs and endanger the Siltronic building. Since remedies are evaluated and selected in the EE/CA, the assumption of a 3:1 slope in the Draft EE/CA inappropriately and prematurely eliminates consideration of more aggressive sediment removal alternatives. Also, given the presence of Siltronic's building and that uplands SCMs will be realities on the ground during implementation of the in-water sediment remedy, temporary engineering measures designed to stabilize the slope and protect existing facilities that also allow for sediment excavation (e.g., mid-bank to top-of-bank sheetpile walls) should be considered.

11. DEQ's March 21, 2008 letter commenting on the DNAPL/Groundwater FFS² informed NW Natural that planning, design, and implementation of uplands SCMs must take into consideration future riverbank work. Since that time DEQ has consistently maintained:

- Future riverbank work should not interfere with installation and/or operation of uplands SCMs and/or DNAPL/groundwater treatment system equipment, buildings, or piping; and
- Uplands SCMs should not limit NW Natural's ability to develop a complete and effective approach to addressing the riverbank.

Draft EE/CA Alternatives 4 and 5 results in removal of uplands SCMs (i.e., Fill WBZ interceptor trench and Alluvium WBZ HC&C system) due to slope layback assumptions and then use this outcome to argue for elimination of these alternatives. For clarification, DEQ does not consider damage and/or destruction of uplands SCMs to be justifications for removing otherwise valid remedial alternatives from consideration in the Draft EE/CA. DEQ's comment regarding the limitations of the 3:1 slope

² Anchor QEA, LLC, 2007, "Groundwater/DNAPL Source Control Focused Feasibility Study – NW Natural 'Gasco' Site," received October 12 (amended November 9, 2007), a report prepared for NW Natural.

assumption and the need for the Draft EE/CA to evaluate temporary engineering measures applies here.

12. The comparative analysis of alternatives concludes that all alternatives are protective and meet sediment RAOs and that the only balancing factor that differentiates between alternatives is short-term effectiveness (i.e., the more sediment dredging the greater the detrimental impact to the environment). This is largely based on NW Natural's position that:
- Rigid containment during dredging is ineffective and potentially harmful (national examples of problematic applications are discussed in detail, but not the successful local application with similar contaminants at Arco);
 - The F&T model predicts natural burial of contaminated sediments;
 - Waiting 35+ years for MNR to achieve RAOs/RGs is acceptable;
 - The upland HC&C system provides an adequate long-term remedy for contaminated subsurface river sediment; and
 - Remedial alternatives involving sediment and riverbank removal will compromise existing structures (e.g., Siltronic building) and/or destroy uplands SCMs.

As discussed above, making different assumptions and providing a more graduated range of alternatives would likely lead to different conclusions. In other words, it appears that the Draft EE/CA heavily weights remedial alternatives evaluations to favor minimal remedial action. Based on this information DEQ concludes the Draft EE/CA is less objective than it should be.

13. DEQ has numerous general comments on the portions of the Draft EE/CA involving human health and ecological risk.
- DEQ considers the list of COI included in Section 2.5.1.1 (see page 24) to be incomplete without "gasoline range hydrocarbons." It is unclear why this constituent was not included in the SOW and carried forward in the Draft EE/CA, as some of the highest concentrations in Portland Harbor are detected in sediments offshore of the Gasco site. Based on this information, DEQ considers gasoline range hydrocarbons to be an important site-specific COI. Furthermore, given gasoline range hydrocarbons are present above baseline ecological screening levels in offshore sediment, the Draft EE/CA should consider concentrations of this constituent to be a COPC in water and sediment for the project.
 - Section 2.5.2 discusses PCB background (see page 27). Currently, EPA and DEQ do not agree with the LWG's depiction of PCB background in the draft PHFS. It needs to be made clear in the Draft EE/CA that when the LWG discusses a range of 5 – 37 ug/kg for PCBs, this refers to the upper percentiles of the database, not average values.
 - EPA and DEQ have not reviewed the LWG's risk management recommendations in the draft PHFS, and therefore are not in a position to accept the recommendations made in Section 2.7.2 in the Draft EE/CA (see page 42).
 - Section 2.7.2 (see page 43) of the Draft EE/CA does not evaluate RG levels below background or less than 0. Risk-based goals that are below background should highlight the importance of background as a remedial goal.
 - Regarding BaP remedial goals:
 - EPA and DEQ have not accepted the sensitivity evaluation in Appendix E of the draft PHFS. The PRG for BaPEq as presented by EPA is for RME exposure. Table 7.2-1 of the Draft EE/CA seems to imply that the RG represents an upper percentile much greater than 99 percent. The basis for this evaluation is Appendix E of the draft PHFS. The distributions of parameter

values were not discussed with the agencies. Some of the important values are inappropriately characterized as upper percentiles. For example, the RME value of 260 days/year is not necessarily a maximum value. Similarly, the sediment ingestion rate of 50 mg/day is not a maximum. In addition, RME values are a mixture of means and upper percentiles such that the final calculated risk is a reasonable maximum, not an extreme percentile value.

- Section 4.1.3.1 indicates EPA developed a PRG for BaP exposure through clam consumption (see page 77). However the LWG did not develop a corresponding remedial goal. The agencies do not necessarily accept the reasoning by the LWG for not developing a BaP RG. It should be noted that EPA may develop an RG for BaP based on clam consumption.
- Section 4.3.1 of the Draft EE/CA reiterates the LWG's conclusion from the draft PHFS that there are no hot spots anywhere in the Portland Harbor study area. To date neither DEQ nor EPA have accepted the LWG's conclusion. That said, DEQ considers the subject of Hot Spots to be a matter requiring resolution in the draft PHFS which should then be incorporated into the Draft EE/CA. For example, the LWG does not recognize hot spots for petroleum hydrocarbons because hydrocarbons are considered to be a mixture of chemicals (see Appendix F, page 4; Table F 2-1). However, DEQ has stated to the LWG and NW Natural that TPH is considered a substance that needs to be included in hot spot evaluations for non-carcinogenic and ecological effects. Non-cancer effects of PCBs need to be considered in determining hot spot levels. Although, it is acceptable to consider individual congeners for cancer hot spots, the lowest hot spot levels for PCBs are based on non-cancer effects. DEQ now has a hot spot table to facilitate the non-cancer evaluations of PCBs.
- DEQ notes the benthic mean quotient approach discussed in Appendix F (see page 78) has not been accepted by EPA or DEQ.
- There are issues associated with draft PHFS where data screening is concerned. Since the Draft EE/CA relies on the draft PHFS to provide appropriate screening there are several inaccuracies that need to be revised. Incorporation of issues associated with the draft PHFS into the Draft EE/CA presents problems providing complete comments on the Draft EE/CA. Examples are provided below:
 - Use of the comprehensive benthic approach should be removed. This approach uses the individual sediment quality guidelines (SQGs) that were developed from the floating point model in a mean quotient analysis. This is technically invalid and the issue has been identified as a part of the BERA comments from EPA (July 10, 2012). Floating point model SQGs are not independent and therefore must be used as a set for screening.
 - Lines of evidence and hazard quotients greater than 1 from the BERA appear to be missing from the Draft EE/CA presentation and analysis. For example, surface water lines of evidence were inappropriately dropped through the management recommendations in the draft PHFS and therefore were not included in the Draft EE/CA. This also applies to transition zone water. These additional lines of evidence need to be added back to the Draft EE/CA.
- DEQ believes variability in bioassay results is expected at the Gasco site as matrices with low bioavailability but very high concentrations are mixed with free product and high bioavailability matrices. Continued empirical testing using bioassay tests is needed to bound toxic areas. The adequacy of the predictive models should be particularly suspect at this site and should be weighted low as a line of evidence in determining appropriate Draft EE/CA boundaries.
- The Draft EE/CA proposes that the results of a bioassay test for a given location exhibit either:
1) a level 3 response for one organism; or 2) that each organism must exhibit a level 2 response

in order to be classified as a “hit.” The text associated with this management decision is in the Draft EE/CA as follows: “...to support the identification of the benthic risk areas (see Section 4.4.2), test sediment locations with bioassay results indicating significant toxicity were identified. As described in the draft PHFS (Anchor QEA 2012a), significant toxicity was considered to be one Level 3 toxicity endpoint (midge survival or growth or amphipod survival or growth), or two Level 2 endpoints. *For the purposes of this EE/CA, significant toxicity is designated as a ‘hit’* (italics added for emphasis).” DEQ disagrees with this approach. A station should be classified as a “hit” when there is a Level 2 response in either the *Chironomus* (midge) or *Hyalella* (amphipod) bioassay tests.

- It is unclear to DEQ why the Draft EE/CA boundary does not extend beyond the northern NW Natural property line given contamination above risk based levels extends further downstream.